November, 1942
Radio Marketing Service Engineer

ULTRA 330

Four-valve, plus rectifier, three waveband superhet with PB switching for wavechange and radiogram. Provision is made for PU and external speaker with an internal LS muting device. For operation from 200–260-volt AC mains, 40–100 cycles. Released Sept., 1941, by Ultra Electric, Ltd., Acton, W.3.

Circuit.—The aerial input may be switched to the coupling coils, L1 (SW), L3 (MW), and grid coil L5 (LW). The SW and MW circuits have tuned grid coils, L2 and L4, but the LW circuit comprises L5 only with its trimmer condenser and impedance coupling components, R2 and C2.

The signal from the tuned circuits is fed via C28 to the control grid of the triode heptode frequency changer valve, V1. This valve is biased by R6 and C5 in the cathode circuit. The oscillator triode section has tuned anode coils L7 (SW), L9 (MW), and L11 (LW) with grid reaction windings L6, L8 and L10 for the SW, MW and LW bands respectively.

R5 and C30 are the grid leak and condenser; R9 is a damping resistance for the short wave band while C8 in the same circuit gives additional coupling by virtue of its common impedance in the grid and anode circuits. On gram the oscillator grid is connected through C30 to chassis.

The screen of V1 is fed from the HT line via R23 decoupled by C29 with a stabilising resistance R4.

HT for the oscillator anode is obtained through the voltage dropper R24, the HF coupling to the anode coils being via C9.

Both IF transformers are inductively tuned with fixed condensers in parallel with the coils. L12, C4, L13, C7, comprise the first IFT in the anode circuit of V1 and feed the signal to the control grid of the variable mu HF pentode V2, which is biased by R8 in its cathode circuit. C14 is decoupling condenser for R8.

Both valves have AVC applied to their grid circuits from the double diode triode V3. The AVC diode of this valve is fed from the anode of V2 via C16, the anode load being R15 and R16. V2 grid circuit is connected to the centre tap of the network via R17 and decoupling condenser C15, while V1 grid is supplied from the same connection via R18, decoupled by C6.

The signal diode of V3 is fed from the second IF transformer L14, C13, L15, C18, the diode load being R9 and R10. The latter is the volume control to which the "on-off" switch is ganged. The slider picks off the required signal which is transferred via C19 to the grid of the triode section of V3. R11 is the grid to cathode resistance.

V3 is biased by R14 decoupled by C20 in the cathode circuit. The anode load is R12, R13. C21 is the anode to cathode HF by-pass condenser, while the LF signal is taken from R12 via the coupling condenser C22 and grid stopper R20 to the grid of the output pentode valve, V4. R19 is the grid to cathode resistance, while a variable tone correction circuit, C26 and R21, is connected across the grid circuit. V4 is biased by R22 which has no decoupling condenser, so that a certain amount of negative feedback is available.

The anode circuit comprises a stabilising resistance, R25, and the primary L16 of the output transformer. This winding is shunted by a tone correcting condenser, C23. The secondary winding L17 of the output transformer is coupled to the low-resistance speech coil of the energised loudspeaker, the field winding of which is L20.

A humbucking coil, L18, is connected in series with the 2 ohm speech coil, L19. Extra loudspeaker sockets are provided across L17 and the internal speaker may be muted by withdrawing the plug from its socket in the rear of the chassis.

The HT circuit is quite standard. V5 is a UU6 full-wave rectifier valve and smoothing is carried out by the field winding L20, reservoir condenser C25 and smoothing condenser C24.

The pilot lamps are fed from a separate secondary winding on the mains transformer. The mains are HF filtered by C27.

GANGING

IF Circuits.—Switch receiver to MW and fully mesh gang condenser vanes. Turn volume control to maximum and inject a 470 kcs signal into aerial and earth sockets of receiver.

Adjust L15, L14, L13 and L12 in that order for maximum output keeping input low to avoid AVC action.

In receivers fitted with an IF filter in the aerial circuit adjust the trimmer of the filter on the IF signal for *minimum* output.

MW Band.—Switch receiver to MW and set pointer to 200 metre calibration mark on scale. Inject a signal of 200 metres and adjust T1 and T2 for maximum output.

Inject and tune in a 500 metre signal and adjust T3 for maximum output, rocking gang.

LW Band.—Switch to LW and set pointer to 1,000 metres on scale calibration mark. Inject a signal of 1,000 metres and adjust T4 and T5 for maximum output.

Inject and tune in a signal of 1,200 metres; adjust T6 for maximum output while rocking gang.

SW Band.—Switch to SW, inject and tune in 19 metre signal and adjust T7 and T8 for maximum output.

There is no series padder on short wave.

RESISTANCES

R	*Ohms*	*R*	*Ohms*
1	1,000	14	1,500
2	10,000	15	.75 meg
3	1 meg	16	.25 meg
4	60	17	1 meg
5	50,000	18	1 meg
6	200	19	.5 meg
7	10	20	1,000
8	200	21	.5 meg
9	100,000	22	175
10	.5 meg	23	25,000
11	1 meg	24	50,000
12	30,000	25	60
13	30,000		

VALVE READINGS

(with 1,000 o-p-vmeter; no signal; tuning at 300m).

V	*Type*	*Electrode*	*Volts*	*Ma*
1	TH41	Anode	242	2.4
		Osc. anode	90	2.4
		Screen	77	6.9
		Cathode	2	11.7
2	VP41	Anode	242	12
		Screen	242	3
		Cathode	2.75	15
3	HL41DD	Anode	120	.8
		Cathode	2.45	1.75
4	Pen 45	Anode	225	34
		Screen	242	4
		Cathode	7.5	38

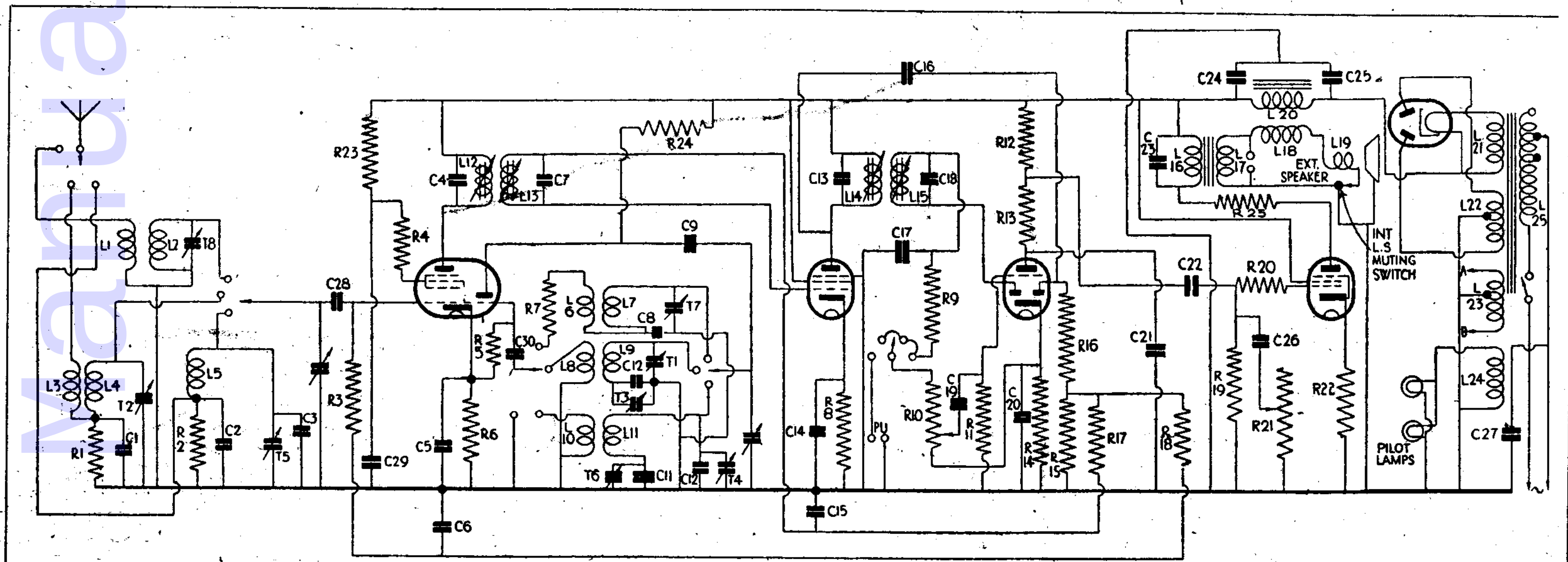
Pilot lamps 6.5 v, .3 amp MES.

CONDENSERS

C	*Mfds*	*C*	*Mfds*
1	.004	16	10 mmfd
2	.002	17	.0002
3	30 mmfd	18	100 mmfd
4	100 mmfd	19	.004
5	.1	20	50
6	.02	21	500 mmfd
7	100 mmfd	22	.02
8	.004	23	.004
9	100 mmfd	24	16
10	330 mmfd	25	8
11	80 mmfd	26	.02
12	60 mmfd	27	.004
13	100 mmfd	28	100 mmfd
14	.1	29	.1
15	.02	30	500 mmfd

WINDINGS

L	*Ohms*	*L*	*Ohms*
1	.2	14	4.5
2	.3	15	4.5
3	—	16	420
4	3	17	.6
5	24	18	.1
6	6.2	19	2
7	—	20	1,000
8	.6	21	very low
9	5.7	22	430
10	1.3	23	.1
11	14	24	.2
12	4.5	25	39
13	4.5		



Removing Knobs

SOME knobs with a metal bushing are in the habit of sticking to the spindle when the grub screw has been removed. This is caused by the knob being turned too hard when the screw is tight; the slip on the spindle scores it and raises part of the surface.

A simple cure consists of putting some emery powder into thin oil or paraffin and allowing a few drops to work into the grub screw hole (remove the screw first). The knob can now be turned around a few times, and it will be found that the grinding action will wear down the high spots and release the knob bush.

Where a nut type of screw has the nut part badly sheared, it is sometimes useful to remember that a cut made with hacksaw or file will turn this into a screw which can be turned with a screwdriver. This is useful for certain types of trimmer screws which are hard to obtain.